

Application of: Shiliang Li et al

Serial No. 10/584,010

Date: June 21, 2006

Page - 6 -

### **REMARKS**

In response to the Official Action mailed November 20, 2007, Applicant respectfully requests reconsideration, reexamination and allowance of claims 1-13 in view of the amendments and the following remarks.

Applicant appreciates that its claim for priority has been recognized and that the certified copy of the priority documents have been received and acknowledged. Applicant also acknowledges that the Information Disclosure Statement has been received and reviewed by the Examiner.

In order to better express the invention of the present application, Applicant has enclosed herewith a substitute specification and has amended claims 1, 6, 8 and 13. No new matter has been added.

The Office Action has rejected claims 1-13 under 35 U.S.C. Section 101 and 103(a), the following remarks address these rejections.

**1. The applicant has amended claim 1 such that it now complies with the requirements of 35 USC§101 and is not obvious in view of the cited references.**

The present invention relates to a new method for locating records on a data page. By using this invention, the obtained deviation value of the record to be searched on data page is a concrete and fixed result; since this deviation value is physical deviation address of this record on the data page, it can be used to directly read out the record without needing to search the physical deviation address of this record orderly from the first record on the corresponding data page, thereby saving the time for locating the record on the data page. As such and as currently amended, the claims now show a useful, concrete and tangible result.

Further, amended claim 1 is now in compliance with the provisions of 35 USC§103.

(1) The bitmap index of the cited references is different from the directory structure of the present invention.

According to the technical solution disclosed in Kosas, the bitmap index is an index structure tailored for columns (attribute) with a large amount of same values; it is used to store corresponding column (attribute) value of each record with relatively small space so as to

expedite the searching.

For example, assume that the “user information table” consists of a “gender” column used to identify the gender of users, if the “user information table” includes 10 records, then the following bitmap index can be created for this column (attribute): 0110000110, in which, ‘0’ represents female, and ‘1’ represents male; this bitmap index indicates that the first user (the first record) is a female; the second user (the second record) is a male; the third user (the third record) is a male; the fourth user (the fourth record) is a female; ....; the tenth user (the tenth record) is a female.

By using the above bitmap index, when the ratio between the male and female users is to be searched, it does not need to search each record in the data table, instead, it only needs to perform simple calculation according to the numbers of ‘1’ and ‘0’ in the bitmap index, thereby expediting the searching.

The bitmap index and the directory structure of the present invention have, among others, the following substantive differences:

- a) the bitmap index only contains the record ID (row ID), while the directory structure of the present invention contains the deviation address of the records.

According to the definition of bitmap index, the bitmap index structure only includes the record ID. In the above example, the first bit of the bitmap index corresponds to the first record, i.e. the first row; and the tenth bit corresponds to the tenth record, i.e. the tenth row.

The directory structure of the present invention includes the deviation address (also called as the pointer of the records) of the records stored on the data page, which corresponds to the concrete storing address of the corresponding record on the page.

- b) The bitmap index is created according to the detailed contents contained in each record; while the directory structure of the present invention is created according to the storing address of each record on the page.

According to the definition of bitmap index, the bitmap index is created based on a certain column (attribute) of the record, when the value of this column (attribute) changes, the bitmap index will change correspondingly. In the above example, the bitmap index is created according to the “gender” column of each record in the “user information table”. Suppose the

second record is replaced by a record of female user, then the bitmap index will change to 0010000110.

However, the directory structure of the present invention is unrelated to the value of each column (attribute) of the record, it only relates with the concrete storing address of the record on the page. In other words, when the storing address of the record changes the corresponding deviation address value of the directory structure will also change.

Since the bitmap index and the directory structure of the present invention have the above substantive differences, their technical problems to be solved as well as the technical effects produced are both different. The using of the directory structure of the present invention can expedite locating one record on the data page. Said locating refers to obtaining the storing address of this record on the page.

For example, when the record is stored on the page in one of the following manners, the using of the directory structure of the present invention can rapidly locate the record.

i) each record is stored on the page in order, and each record has a different length.

Since the length of each record is different, if the directory structure of the present invention is not applied, the concrete storing address of the records on the page, except the first record, can not be obtained directly; they can only be located orderly according to the pointer (deviation address) recorded in each record that points at the next record, i.e. locating the second record according to the first record, locating the third record according to the second record....

The directory structure of the present invention stores the deviation address of the records, so in such storing manner, the corresponding record can be located directly by the deviation address, thereby expediting the locating of records.

ii) Each record is stored orderly in the manner of linear linked list

If the directory structure of the present invention is not applied, the concrete storing address of the records on the page, except the first record, can not be obtained directly, they can only be located orderly according to the pointer (deviation address) stored in each record (the node of each linked list) that points at the next record (the next node).

Also, in such storing manner, using the directory structure of the present invention can directly locate the corresponding record, thereby expediting the locating of records.

Since index, bitmap index only contain the record ID (row ID), when the length of each record is different or each record is stored orderly in the manner of linked list, the record ID (row ID) and the concrete storing address of the corresponding record have no direct corresponding relationship; so using the record ID (row ID) can not solve the technical problem of low speed of record location existing in the prior art.

The technical scheme of claim 1 includes the technical feature of “setting a directory structure composed of a group of record deviations”, so the records can be located according to the record deviations stored in the directory structure, thereby expediting locating records.

To sum up, both the technical solutions disclosed by Kosas and Vagnozzi do not include the technical feature of “setting a directory structure composed of a group of record deviations”, meanwhile, they also do not provide any teaching that would lead one having ordinary skill in the art of using the above technical feature to solve the technical problem of low speed of locating records. So the above technical feature is non-obvious for a person skilled in the art, and it is therefore respectfully suggested that claim 1 as amended is not obvious in view of the cited references and is therefore allowable.

**2. When claim 1 possesses novelty and inventiveness, claim 2 will also.**

It is respectfully suggested that claim 2 is now also allowable.

**3. Claim 3 is also not obvious in view of the cited references.**

The Applicant believes that the technical solution disclosed in Kosas only includes using locating algorithm to directly locate the records; while the technical scheme of claim 3 is using locating algorithm to judge which directory structure (dir\_slot) the record belongs to, so they solve different technical problems.

When one directory structure contains a plurality of records, the method applied in the technical scheme of claim 3, i.e. first judging the directory structure (dir\_slot) that the record to be searched belongs to, then locating the concrete position of the record, can achieve faster locating speed than the method of directly locating the record as disclosed in the technical scheme of Kosas. The following is detailed analysis by taking dichotomy as an example:

1) when using the Kosas' method of directly locating records, since the directory structure may contain a plurality of records, it first needs to acquire the record ID (represented as *low*) of the first record contained in the first directory structure, and the record ID (represented as *up*) of the last record contained in the last directory structure; then to obtain the medium value *mid* of *up* and *low*; since which directory structure the *mid* belongs to is unknown, it also needs to acquire the directory structure (*dir\_slot*) to which the midth record belongs, and acquire the record deviation whose record ID is *mid* from this directory structure, and then to judge the contrastive relationship between the record and the field structure after reading out the record according to the deviation; in the sequent dichotomizing locating process, the above steps need to be repeated.

2) When employing the technical scheme of claim 3, since the search uses dichotomy and takes the directory structure as unit, the value of *low* takes the serial number of the first directory structure and the value of *up* takes the serial number of the last directory structure, then the value of *mid* can be calculated simply by  $(\text{low} - \text{up})/2$ ; since each directory structure contains the deviation of its first record, the corresponding record can be acquired by directly extracting the deviation of the first record of the directory structure corresponding to the serial number *mid*, and the contrastive relationship between this record and the field structure is judged; and finally the directory structure to which this record belongs is obtained. After acquiring the directory structure that this record belongs to, the concrete position of the record to be searched/located can be searched in the records included in this directory structure.

From the above, it can be seen that compared with method 2), said method 1) includes one or more steps of acquiring the directory structure that the midth record belongs to for several times, so the speed in method 1) is slower.

To sum up , compared with the Kosas' technical solution, since the technical scheme of claim 3 includes the technical feature of “first judging which directory structure the record belongs to by using locating algorithm, then further locating this record in the directory structure that this record belongs to”, it can achieve better beneficial results when solving the technical problem of fast locating record on a data page; the technical solutions disclosed by Kosas and Vagnozzi do not provide any inspiration of employing the above technical feature to solve the

above technical problem. Therefore, the above technical feature is non-obvious for the person skilled in the art, and claim 3 is in compliance with the provisions of 35USC§103.

**4. When claim 1 possesses novelty and inventiveness, claim 4 will also.**

It is respectfully suggested that claim 4 is now also allowable.

**5. When claim 4 possesses novelty and inventiveness, claim 5 will also.**

It is respectfully suggested that claim 5 is now also allowable.

**6. Applicant has amended claim 6, and the amended claim 6 meets the requirement of 35 USC§103.**

Claim 6 as amended is not made obvious by the cited references.

Applicant believes that the Vagnozzi's technical solution only includes creating indexes for each record and page, aims to search out the record ID of the record that meets the searching requirement or the page ID where the record meeting the searching requirement locates.

Compared with the Vagnozzi's technical solution, the technical scheme of claim 6 is different in: it provides a specific method of first searching out the directory structure (dir\_slot) corresponding to the record meeting the searching requirement, then searching the deviation address corresponding to this record in the directory structure.

To sum up, since claim 6 includes the technical feature of "after finding the dir\_slot, selecting records orderly from the dir\_slot to compare with the field structure, till the record is the last record of the dir\_slot", it solves the technical problem of locating records in directory structure; the technical solutions disclosed in Kosas and Vagnozzi do not provide any inspiration of employing the above technical feature to solve the above technical problem. Therefore the above technical feature of claim 6 is non-obvious for the person skilled in the art, and claim 6 is in compliance with the provisions of 35 USC§103.

**7. Claim 7 is in compliance with the provisions of 35 USC§103.**

Applicant respectfully holds that the technical solution disclosed in Vagnozzi only includes the technical content of incorporating indexes in order to save storage space.

The technical scheme of claim 7 is: when the number of records contained in one directory structure (dir\_slot) exceeds a preset threshold, splitting the directory structure into two ones, as such the problem of overtime record locating in one directory structure due to too many records contained in the directory structure can be avoided.

To sum up, since claim 7 includes the technical feature of “splitting the dir\_slot into two ones”, it solves the technical problem of overtime record locating in directory structure; while the technical solutions disclosed in Kosas and Vagnozzi do not provide any inspiration of employing the above technical feature to solve the above technical problem. Therefore, the above technical feature is non-obvious for the person skilled in the art, and claim 7 is in compliance with the provisions of 35 USC§103 and is now allowable.

**8. Applicant has amended claim 8 and avers that when claim 7 possesses novelty and inventiveness, claim 8 will also possess the novelty and inventiveness.**

It is respectfully suggested that claim 8 is now also allowable.

**9. When claim 1 possesses novelty and inventiveness, claim 9 will also possess the novelty and inventiveness.**

It is respectfully suggested that claim 9 is now also allowable.

**10. When claim 9 possesses novelty and inventiveness, claim 10 will also possess the novelty and inventiveness.**

It is respectfully suggested that claim 10 is now also allowable.

**11. When claim 2 possesses novelty and inventiveness claims 11 and 12 will also possess the novelty and inventiveness.**

It is respectfully suggested that claims 11 and 12 are now also allowable.

Application of: Shiliang Li et al

Serial No. 10/584,010

Date: June 21, 2006

Page - 13 -

**12. Applicant has amended claim 13 to make it meet the requirement of 35 USC§103.**

The reason for the nonobviousness of amended claim 13 is same with that of the amended claim 6 as described previously in item 6. It is respectfully suggested that claim 13 is now also allowable.

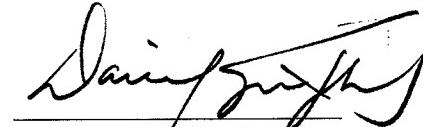
**Conclusion**

Applicant respectfully request continued examination and allowance of the pending claims. Applicant suggests that the claims are in condition for allowance and respectfully requests an early notice of allowance. Further, if there are any fees due as a result of this amendment, which have not otherwise been attended too, the Commissioner is hereby authorized to charge any underpayment, or credit any overpayment, to Deposit Account No. 23-0920. Should any petitions (e.g., for time extensions) be necessary, applicant requests that this paper constitute any such necessary petition.

Application of: Shiliang Li et al  
Serial No. 10/584,010  
Date: June 21, 2006  
Page - 14 -

If the Examiner finds that there are any outstanding issues that may be resolved by a telephone interview, she is invited to contact the undersigned at the below listed number.

Respectfully submitted,



Daniel M. Gurfinkel  
Reg. No. 34,177

Dated: January 18, 2008

**WELSH & KATZ, LTD.**  
120 South Riverside Plaza, 22<sup>nd</sup> Floor  
Chicago, Illinois 60606  
(312) 655-1500 Telephone;  
(312) 655-1501 Facsimile